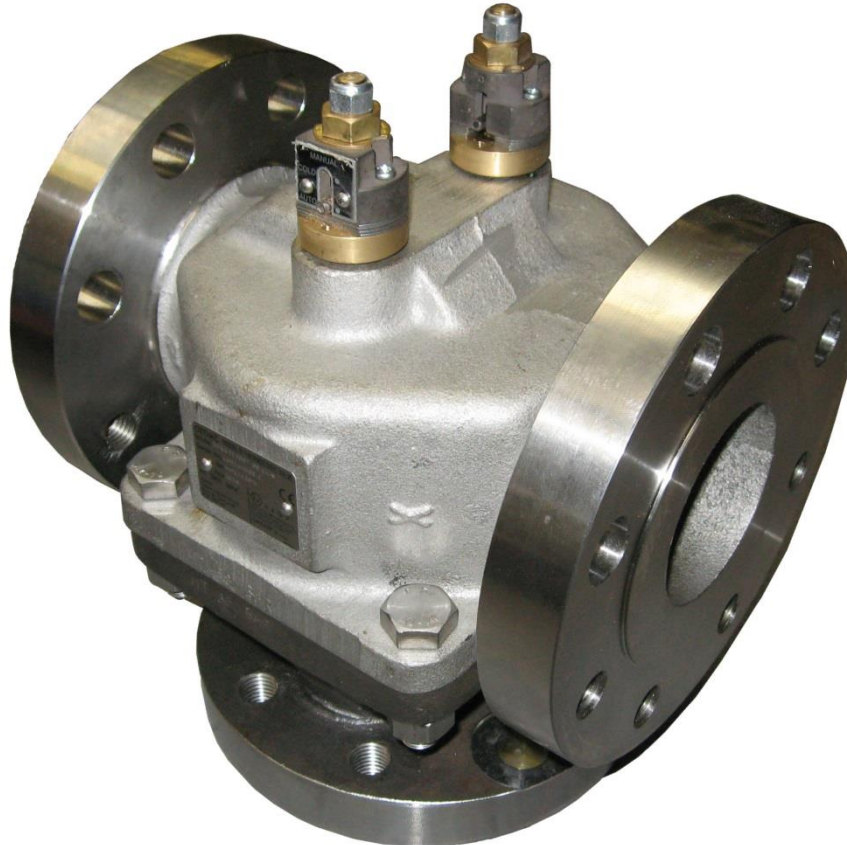




Model B Valve – Thermostatic valve for diverting and mixing applications

Installation, Operation and Maintenance Manual



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Section 2 Introduction

2.1 Scope

This manual details the installation, operation and maintenance of the AMOT Model B Valve range.

2.2 Safety

Certain operations within this manual are potentially hazardous and could cause injury to personnel or damage to equipment if the instructions are not carried exactly as described. Where a significant, potential hazard exists, the following text appears immediately before steps in the procedure that present a particular hazard:

WARNING

A Warning identifies a hazard that could cause injury to personnel. The text of the warning describes the hazard and details the precautions that must be applied before the next step of the procedure is carried out.

CAUTION

A Caution identifies a hazard that could cause damage to equipment. The text of the caution describes the hazard and details the precautions that must be applied before the next step of the procedure is carried out.

Note

A Note contains supplementary information that may be useful to the Operator before the next step of the procedure is carried out.

2.3 Product support

All necessary settings and, where appropriate, alterations inside the equipment are described in this Operating Manual. If any difficulties arise during start-up, you are asked not to carry out any unauthorized actions on the unit. You could endanger your rights under the equipment warranty.

For spares and service support, call the telephone number listed on the back cover of this Manual.

2.4 Typographical conventions

Footnotes

Where space in the text or figures to place a note is restricted, a footnote is used. They consist of two parts:

- A mark indicating which part of the text or figure is affected by the note. This takes the form of a superscript number eg. Abc¹.
- A note in smaller font at the bottom of the affected page beginning with the corresponding number in the text (see bottom of page):

¹ This footnote applies to the part of the text or figure, marked with a superscript number 1.

Section 3 Description

3.1 Overview

The Model B Valve is designed to provide fully automatic, 3-way fluid temperature control for diverting or mixing applications. Typical applications include engine water jackets, lubricating oil cooling systems, and mixing and diverting of fluids in process control and industrial applications.

The thermostatic element (also referred to as 'element') in a Model B valve is fully enclosed and factory set, providing tamper-proof operation. For maintenance or to achieve a different set temperature the element can be changed, although this requires removal of the valve from its pipe work except the Model 8B Valve where the elements are accessible whilst the valve is in position. Elements are available with set temperatures from 13 to 116°C (55 to 240°F). Valves are available in nine sizes, and a variety of materials to suit different fluids.

3.1.1 Manual override

As an option, Model B Valves can be fitted with a manual override, which allows the operator to drive the unit towards the maximum cooling position. On the larger sizes with multiple elements, each has its own override. Manual override should only be used in emergencies; however on valves with multiple elements sometimes one element can be locked partially open to prevent the cooler from freezing and to change operating temperature slightly.

3.2 Features

Typical applications

- Lubricating oil temperature control.
- Jacket water high temperature (HT).
- Secondary water low temperature (LT).
- Heat recovery.
- Water saving applications.
- Boiler inlet temperature control.
- Co-generation, cooling towers.
- Seawater cooling.

Key benefits

- No external power source required – simple low cost installation.
- No user setting needed – 'fit and forget' solution.
- Small No of parts – simple maintenance and low cost ownership.
- Robust design capable of high vibration and shock applications

3.3 Identification of Model Number

Example Code	4	BO	S	J	075	07	-0	0	-XXX	Code Description	
Valve Size										Nominal Bore Size	Number of Elements
	1 1/2									1 1/2 inch (DN40)	1
	2									2 inch (DN50)	1
	2 1/2									2 1/2 inch (DN65)	2
	3									3 inch (DN80)	2
	33									3 inch (DN80)	3
	4									4 inch (DN100)	4
	5									5 inch (DN125)	6
	6									6 inch (DN150)	9
	8									8 inch (DN200)	16
Valve Model										Model	
		BO								Screwed connections (1 1/2" and 2" only)	
		BO								Flanged (2 1/2" to 8" only)	
		BC								Flanged 'T' configuration (1 1/2" and 2" only)	
		BF								Flanged 'F' configuration (2" only)	
		BH								Screwed high pressure (1 1/2" and 2" only)	
		BR								Manual override (2" to 8" only")	
		BP								Special ST.ST with Manual Override (Refer OMM00144)	
		BQ								Special ST.ST B Valve (Refer OMM00144)	
Valve Material										Valve Material	
		A								Aluminium (not 8 and 33)	
		B								Bronze (not 33)	
		C								Cast Iron*	
		D								Ductile iron	
		S								Steel (2", 2 1/2", 3" and 4" only)	
		R								Stainless steel (2", 2 1/2", 3" and 4" only)	
Port Connection										Port Connection	
		A								Flanged PN6	
		B								Flanged PN10	
		C								Flanged PN16	
		F								Flanged ANSI 125 lb (cast iron, bronze and ductile only)	
		J								Flanged ANSI 150 lb (steel and stainless steel only)	
		H								Flanged ANSI 300 lb (steel and stainless steel only)	
		L								Flanged JIS 10k	
		P								Flanged JIS 5k	
		T								Threaded NPT (1 1/2" and 2BO only)	
		U								Threaded BSP (PL) (1 1/2" and 2BO only)	
Control Temperature (°F)										Control Temperature (°F)	
				***						See Element Temperatures Table 2	
Element Type										Element Type	
				**						See Element / Seal Types Table 3	
Leakhole sizes										Leakhole sizes inches	
							0			None	
							A			1/2" Dia	
							B			1/4" Dia	
							C			3/8" Dia	
							D			1/8" Dia	
							E			1/16" Dia	
							F			3/32" Dia	
							G			3/16" Dia	
							H			5/16" Dia	

Example Code	4	BO	S	J	075	07	-0	0	-XXX	Code Description
Leakhole Quantity										No. of elements with Leakhole
									0	None
									1	One (Max for 2" Size)
									2	Two (Max for 2 1/2" & 3" sizes)
									3	Three
									4	Four (Max for 4" size)
									5	Five
									6	Six (Max for 5" size)
									7	Seven
									8	Eight
									9	Nine (Max for 4" size)
Customer Special Requirements										Customer Special Requirements
									-AA	Standard Product
									***	Customer special code assigned

* AMOT reserves the right to substitute a ductile iron product in place of cast iron to meet customer delivery requirements.

Table 1. – Model Identification

Other Flange connections are available. Contact AMOT for details.

Code	Control Temp		Rated Range				Max Temp Continuous		Max Temp Short Period	
			Crack Open		Full Open					
	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
045	7.2	45	1	39	11	52	16	61	35	95
055	13	55	8	47	20	68	35	95	40	104
057	14	57	10	50	18	65	30	86	40	104
075	24	75	20	68	30	86	38	100	54.5	130
090	32	90	27	81	35	95	43	110	60	140
095	35	95	29	85	41	105	49	120	68	154
100	38	100	34	93	42	108	50	122	63	145
105	41	105	35	95	45	113	55	131	70	158
110	43	110	38	100	47	117	56	133	74	165
115	46	115	40	104	50	122	61	142	79	174
120	49	120	43	110	54	130	66	150	76.2	169
130	54	130	51	124	60	140	68	155	82	180
135	57	135	54	129	63	145	71	160	84	183
140	60	140	57	135	66	151	74	165	88	190
145	63	145	60	140	69	156	79	174	94	201
150	66	150	63	145	72	161	82	180	95	203
155	68	155	66	150	74	165	85	185	96	205
160	71	160	68	155	78	173	88	190	102	216
165	74	165	71	160	80	175	88	190	102	216
170	77	170	74	165	83	181	93	200	107	225
175	79	175	77	170	85	185	102	215	118	244
180	82	180	79	175	88	191	104	220	121	250
185	85	185	82	180	91	196	106	223	121	250
195	91	195	87	188	98	209	107	225	121	250
205	96	205	93	200	102	215	108	226	121	250
215	102	215	98	209	107	225	115	239	120	248
225	107	225	102	216	113	236	118	244	125	257
230	110	230	104	219	115	239	118	244	125	257
240	116	240	108	227	122	252	123	253.5	125	257

Table 2. – Element Temperatures

Code	Element and Valve Seal Material
01	1096X standard with Nitrile seals
02	1096P plated with Viton seals
03	1096X standard with Viton seals
05	6836S saltwater with Nitrile seals
07	2433X manual override with Nitrile seals
08	2433P manual override (plated) with Viton seals
09	6938S saltwater manual override with Nitrile seals
11	5566X higher over-temperature with Nitrile seals
17	7406X manual override higher over-temperature with Nitrile seals
20	5566X reduce stroke with Viton seals
44	1096X with Neoprene seals
45	1096P with Neoprene seals
53	2433X manual override with Viton seals

Table 3. – Element/Seal Types

Other Elements and Seals are available. Contact AMOT for details.

Section 4 Use within the European Union (EU)

4.1 Pressure Equipment Directive (P.E.D.)

The pressure Equipment Directive (PED) 97/23/EC is applicable to the design, manufacture and conformity of pressure equipment and assemblies of pressure equipment with a maximum allowable pressure greater than 0.5 bar.

In its design application of a thermostatic valve, this product is defined as a Pressure Accessory under the terms of the EU Pressure Equipment Directive (PED). If used with fluids defined as Group 2 in the Directive (such as water and lubricating oil) the Model B Valve falls into the Sound Engineering Practice (SEP) category. In this category units are not required to be CE marked.

Some sizes of the Model B Valve are also rated to SEP for Group 1 fluids. This is indicated on the nameplate if applicable.

Users who are uncertain as to the applicability of the Directive should contact the factory, particularly if using more hazardous (Group 1) fluids.

The Model B Valve when suitable for use within the European Community carries a nameplate that is divided into 3 areas, two of which are applicable with reference to the Pressure Equipment Directive. These areas are highlighted in Figure 4-1.

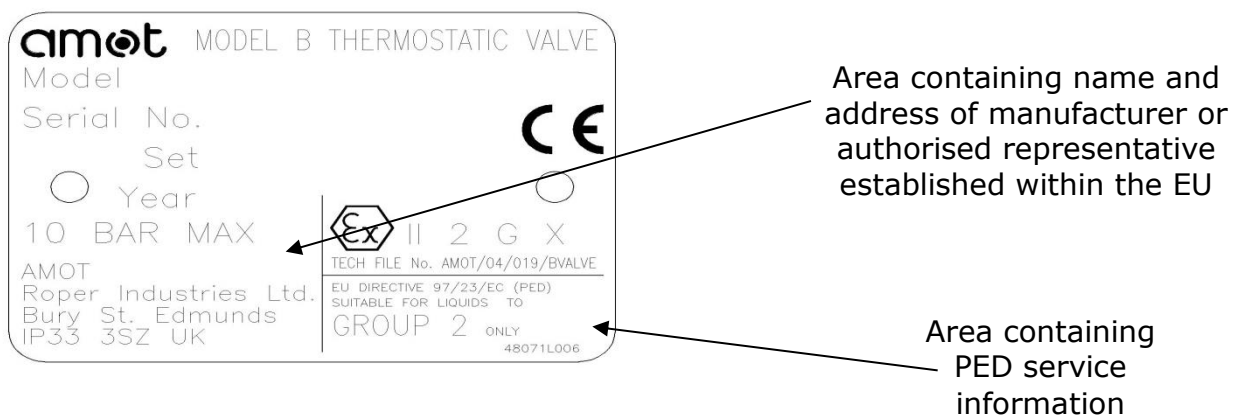


Figure 4-1

The PED service information area contains the following information.

Serial Number - a unique number stamped onto the nameplate to allow traceability of manufacture.

Model Code – an alphanumeric text identifier stamped onto the nameplate that fully describes the type of valve and the ancillary equipment fitted by AMOT.

Max Working Pressure – The maximum pressure that the valve is permitted to see in service.

Equipment complying with the Pressure Equipment Directive must be marked with the name and address of the manufacturer and where appropriate, of his authorised representative established with the European Community.

4.2 Hazardous Area Directive (A.T.E.X.)

The ATEX Directive 94/9/EC is applicable to all equipment both electrical and mechanical that is put into service in a designated hazardous area.

The Model B Valve as mechanical equipment has been assessed in accordance with EN13463 and has been designated as Group II equipment. Group II equipment is suitable for use in places where a potentially explosive atmosphere may be present. Group II equipment shall not be used underground in mines or surface installations of such mines susceptible to firedamp or combustible dust.

The Model B Valve has been assessed for use in places designated as containing hazardous Gas; they shall not be used in places designated as containing hazardous dust.

The Model B Valve uses constructional safety (c) as the method of Protection.

The Model B Valve is suitable for use within the European community and carries a nameplate that is divided into 3 areas two of which are applicable with reference to the ATEX Hazardous Area Directive. These areas are highlighted in Figure 4-2.

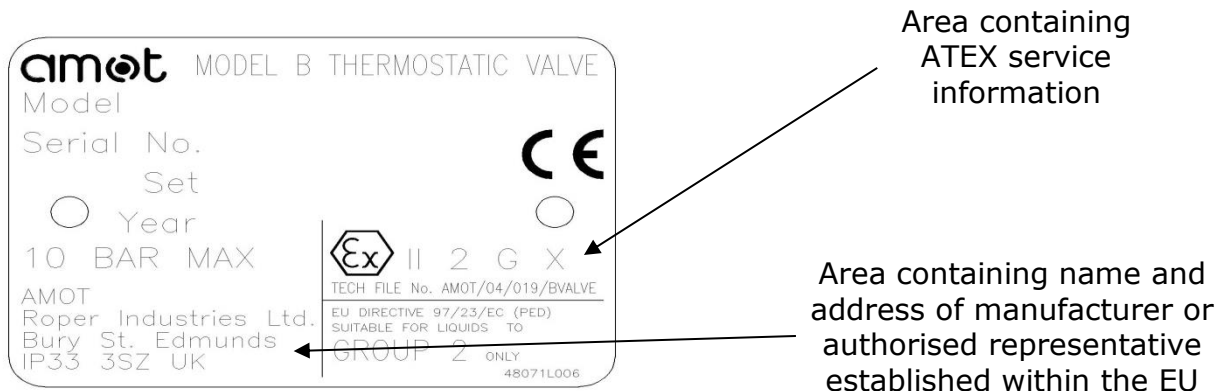


Figure 4-2

The ATEX service information area contains the following information.

Ex Symbol – the EC Mark for hazardous area application

Equipment designation – the equipment designation comprises the following information to specify the potentially explosive atmospheres that the equipment may be used in.

Equipment Group – II (non-mining applications)

Equipment Category – 2

Hazardous Area Type – G (hazardous gas environments)

X – Designates special conditions for safe use apply

Ambient Temperature range – if this is specified it will take the form minimum temperature < Ta < maximum temperature. If it is not specified then the valve may only be used in environments having the ambient temperature between –20°C and +40°C (–20°C < Ta < +40°C).

Technical File No. – The confidential technical file specific to the ATEX approval of the valve.

Equipment complying with the Hazardous Area Directive must be marked with the name and address of the manufacturer and where appropriate, of his authorised representative established with the European Community.

For safe and trouble-free use within hazardous areas the instructions within this Operating and Maintenance Manual should be strictly adhered to.

Under normal operation this valve contains no heat generating parts and assumes the temperature of the internal fluid.

The maximum continuous temperature that the valve can operate at is determined by the temperature element fitted to the temperature regulation part of the valve. This information is contained within the specification section of this manual, also contained in this section is the absolute maximum temperature that the regulated fluid can be allowed to rise to before damaging the temperature regulating elements.

Fluid temperatures in the system where the valve is operating should be continuously monitored and a protective shutdown system is to be activated when the temperatures are outside of normal operating limits.

The maximum internal pressure that this valve is permitted to work at is contained within the specification section of this manual.

The conditions for a safe installation and commissioning of this valve are contained in the installation section of this manual.

The valve must be maintained in accordance with the maintenance section of this manual and between maintenance periods should be kept clean and the paintwork kept in good condition and touched up when necessary to prevent rusting of the external steel parts of the valve.

4.3 Machinery Directive

The Machinery Directive 2006/42/EC is applicable to all assemblies fitted with or intended to be fitted with a drive system other than directly applied human or animal effort, consisting of linked parts or components, at least one of which moves and which are joined together for a specific application.

The Model B Valves supplied by AMOT are classified as Partly Completed Machinery. Partly Completed Machinery is only intended to be incorporated into or assembled with other machinery or equipment thereby forming Machinery.

The Model B Valve must not be put into service until the Final Machinery into which it is to be incorporated has been declared in conformity with the relevant provisions of EU Machinery Directive 2006/42/EC.

Section 5 Installation

WARNING

The valve is heavy, refer to Section 9 (Technical Data). The appropriate manual handling precautions must be applied to avoid personnel injury.

5.1 Installing the valve

5.1.1 Before starting installation

1. Upon receipt, the valve should be checked for damage sustained in shipping. All AMOT valves have nameplates attached, which are stamped with the valve model number and serial number.
2. Understand the intended use of the valve as described in Section 3.
3. Before installation, ensure that the valve is suitable for the purpose, checking temperature, pressure and material parameters, and any special approval requirements. In particular note that Buna N seals are not suitable for certain fluids, including phosphate ester and diester oils. With such oils, nickel plated assemblies should also be specified to protect the bronze parts. Check that the intended pipe fittings are suitable for the application.
4. The valve size should have been selected in accordance with the anticipated flow rate through the valve. To maintain good temperature regulation the pressure drop across the valve should be in the 137 to 482 millibar (2 to 7 psi) range.
5. If the valve is to be fitted at a high point in the system, the system should be vented to prevent trapped air around the temperature elements.
6. For optimum temperature regulation the system should be designed so that the element is in the mid-position under nominal conditions. To achieve this it may be necessary to balance the fluid flow by inserting an orifice in the by-pass circuit.
7. If appropriate read and understand the legal requirements of installing the valve within the European Union as described in Section 4.

5.1.2 Mounting the Valve in the Pipe

The valve may be mounted in any orientation; but should be properly supported and not subjected to excessive bending. Ensure the pipe

flange connections are correctly aligned to avoid stressing the valve body.

For the main flanged ports Bolting and Gaskets should comply with the relevant standard.

All relevant local regulations must also be observed.

5.1.3 Start up

Upon installation and on start up of the system, all parts of the circuit should be closely monitored to ensure correct performance. A system in which the valve has been properly selected for the anticipated flows should operate very closely to the valve's nominal temperature rating.

Water cooling systems will usually operate at or slightly below the nominal temperature. Lubricating oils and most other higher viscosity fluids will operate at or slightly above the nominal temperature.

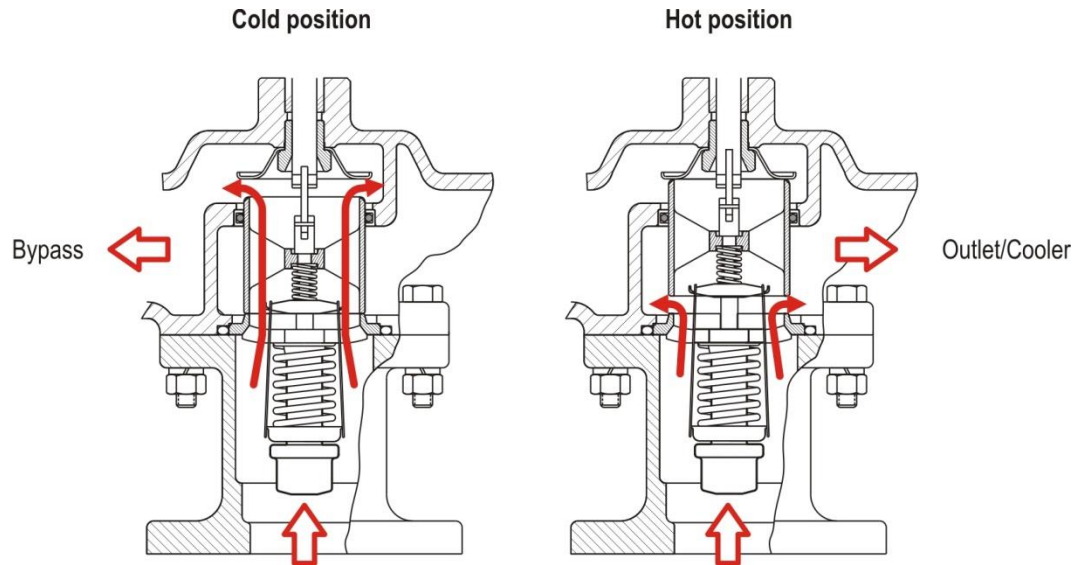
In any system where the indicated temperatures are more than 2.7°C (5°F) from the nominal temperature, then an effort should be made to locate the cause.

Any system operating at an indicated 5.5°C (10°F) or more from the nominal anticipated temperatures may well be malfunctioning and the cause should be located and rectified immediately. See trouble-shooting section for possible causes.

Section 6 Operation

6.1 Operation

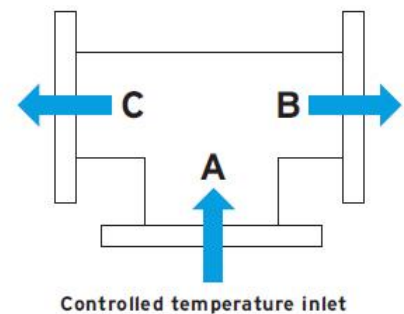
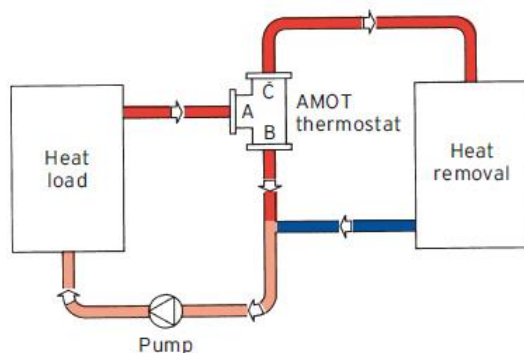
The type B valve is completely automatic in operation, and needs no power supply



The temperature control power is created by the expansion of a wax/copper mixture which is highly sensitive to temperature changes. Large forces are created by the warming/expansion of the mixture which in turn acts upon the sliding valve, thus regulating the flow.

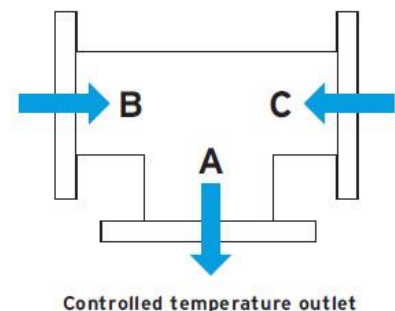
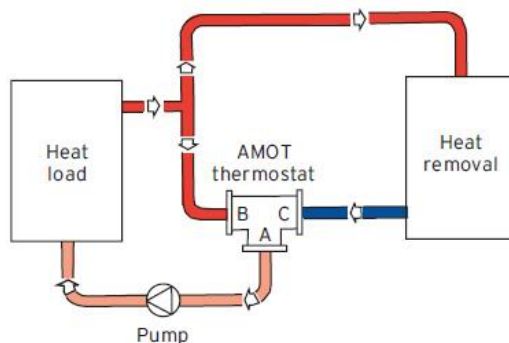
6.1.1 Diverting applications (controls outlet temp from load source)

In diverting applications temperature is sensed at port A, which remains open to port B (bypass) until the fluid temperature reaches a point 3-6°C (5-10°F) below the nominal setting, when the valve will start to move, progressively closing port B and opening port C (the cooler connection). If the temperature continues to rise, port B will be fully closed 4 to 6°C (8-10°F) above the set temperature.



6.1.2 Mixing applications (controls inlet temp to load source)

In mixing applications the hot supply is connected to port B, the cold supply to port C, and the mixed flow appears, via the temperature sensor, at port A. Because of the position of the controlling wax 'pill', in mixing applications the controlled temperature may be 2-3°C above the nominal.



6.1.3 Manual override (if fitted)

CAUTION

Please note that manual override is for emergency use only and if operated incorrectly then potential damage to the valve can occur.

1. If emergency cooling is required then firstly loosen locknut.
2. Turn adjusting nut clockwise until indicator pin has reached 'manual' position or desired cooling has been achieved then tighten locknut. Do not over adjust.
3. If multi element valve then adjust other elements accordingly.
4. When returning to Auto mode loosen locknut, turn adjusting nut anti-clockwise until indicator pin has reached auto position and adjuster slackens then tighten locknut. Do not over adjust or damage may occur to the adjuster nut retaining pins.

Section 7 Maintenance

To obtain maximum service life from the valve, periodic inspection and cleaning should be incorporated into a normal preventative maintenance program.

Before starting any maintenance understand the intended use of the valve as described in Section 3.

If appropriate read and understand the legal requirements associated with the valve within the European Union as described in Section 3.

WARNING

Ensure that all pressure is relieved from within the valve and ancillary equipment and drain system (or isolate valve) before commencing any maintenance work.

7.1 Dismantling the valve

Properly applied and installed AMOT thermostatic valves require minimal maintenance. Inspection at 2 or 3 year intervals is adequate to detect normal wear. In the 8B valve the element assembly may be removed without removing the valve from the connecting piping. All other sizes must be removed from the piping. Some sizes have two or more independent temperature elements.

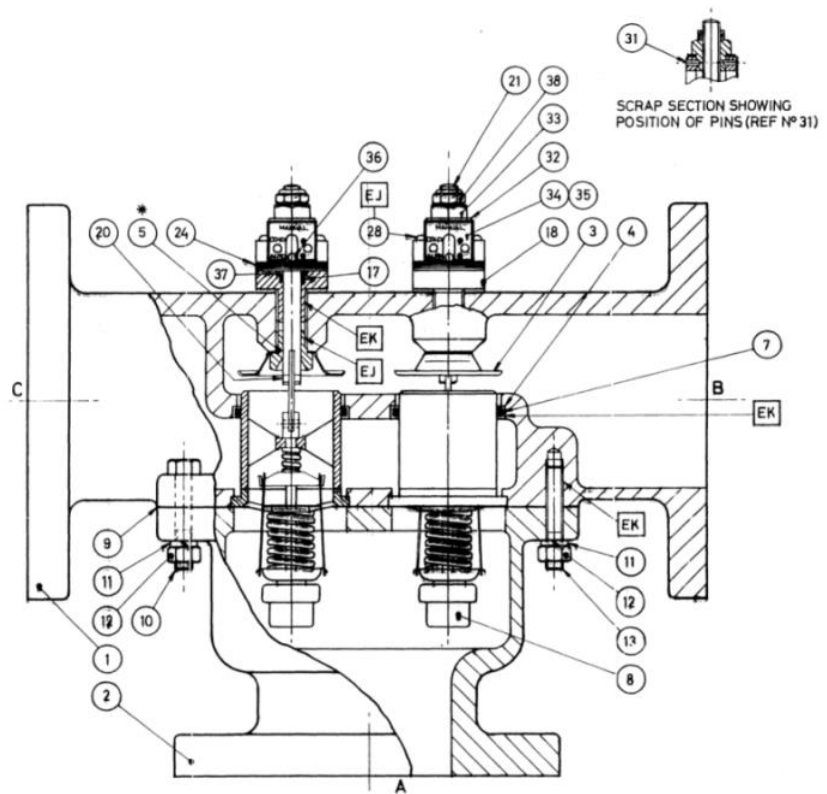


Figure 7.1 - Diagram showing 4" B valve with manual override.

1. Refer to figure 7.1. Remove housing nuts (Item 12) and split valve. Remove the lower housing (Item 2) taking care not to damage the elements. Remove and discard housing gasket (Item 9) ensuring any traces of the gasket are removed from the housing mating faces. Please note that in some sizes of Model B Valves 'O' rings are used instead of gaskets.
2. If removing element from BO valve (non manual override) simply pull the element from the upper housing. Go to step 9.
3. If removing element from BR valve (manual override) only dismantle one at a time to eliminate the chance of the manual override parts being mixed up.
4. Carefully remove the indicator pin (item 36).
5. Remove the locknut (Item 38) from the override stem (Item 21).
6. Remove override housing retaining screws (Item 28).
7. Unscrew override housing from the override stem (Item 21) and set aside the shims.
8. Pull the element from the upper housing and if changing the element un-pin the override stem from the element link.
9. Remove 'O' rings. BO valve item 7. BR valve item 7 & 17.
10. Inspect valve seat for wear or damage. If required replace valve seat (Item 3), remove by unscrewing bushing (Item 5). Bushing A/F 7/8".

7.2 Assembling the valve

1. Lubricate gasket (Item 9) liberally with a good grade of petroleum grease, allow to soak.
2. If valve seat changed, refit bushing with Loctite 241 locking compound.
3. Lightly grease and stretch new 'O' ring (Item 7) and fit into upper housing. Position 'O' ring concentrically to assist element assembly.
4. If replacing a BR valve element, then fit override stem (Item 21) to element link with pin (Item 20).
5. Insert element into the upper housing taking care not to damage the 'O' ring.
6. For BO valves go to step 10
7. For BR valves. Lightly grease 'O' ring (Item 17) and slide over override stem and seat into recess in the stem adaptor followed by the 'O' ring retainer (Item 37).
8. Screw manual override housing onto override stem. Refit shims (Item 24). Ensure indicator plates are facing outward, on 6BR one row to face nameplate and two rows to face other side. Secure housing to stem adaptor with screws (Item 28) and Loctite 241. Fit indicator pin (Item 36) into override stem, ensuring element assembly still closes.

9. Wind manual operator nut and check sliding valve fully closes onto seat. Return valve to auto position and secure operating nut with locknut (Item 38). Ensure washer (Item 32) is free.
10. Position gasket and lower housing over upper housing, secure with nuts and washers (Items 12 & 11). Please note that in some B valves 'O' rings are used in place of gaskets. For nut torque settings see table 1.

Size Code	O ring	O ring	Gasket	Gasket
	Nm	lb ft	Nm	lb ft
1 ½	54	40	N/A	N/A
2	54	40	N/A	N/A
2 ½	80	60	N/A	N/A
3	80	60	N/A	N/A
33	80	60	N/A	N/A
4	54	40	68	50
5	80	60	122	90
6	80	60	122	90
8	80	60	122	90

Table 4 – Tightening torques for housing nuts

7.2.1 User maintenance parts

Size Code	Valve nominal bore		Number of elements
	Inches	mm	
1 ½	1.5	40	1
2	2	50	1
2 ½	2.5	65	2
3	3	80	2
33	3	80	3
4	4	100	4
5	5	125	6
6	6	150	9
8	8	200	16

Table 5 – Number of elements per valve

Part Number	Description	Qty
1096X(°F)	Element assembly	See table 2
1096P(°F)	Plated element assembly	
2433X(°F)	Element assembly with manual override	
2433P(°F)	Plated element assembly with manual override	
5566X(°F)	Element assembly, higher over-temperature	
7406X(°F)	Element assembly, higher over-temperature with manual override	
6836S(°F)	Element assembly, 'Saltwater' plated	
6938S(°F)	Element assembly, 'Saltwater' plated, with manual override	

Table 6 – Element assembly part numbers

Seal Kits						
Size	Material					
	BO/BC/BF/BH			BR		
	Nitrile	Viton	Neoprene	Nitrile	Viton	Neoprene
1.1/2"	46342X151	46342X152	46342X153	46342X154	46342X155	46342X156
2"	46342X201	46342X202	46342X203	46342X204	46342X205	46342X206
2.1/2"	46342X251	46342X252	46342X253	46342X254	46342X255	46342X256
3" 3BO,3BR	46342X301	46342X302	46342X303	46342X304	46342X305	46342X306
3" 33BO, 33BR	46342X331	46342X332	46342X333	46342X334	46342X335	46342X336
4" 4BOA,4BOB 4BOC,4BOD	46342X401	46342X402	46342X403	46342X404	46342X405	46342X406
4" 4BOR,4BOS 4BRR,4BRS	46342X411	46342X412	46342X413	46342X414	46342X415	46342X416
5"	46342X501	46342X502	46342X503	46342X504	46342X505	46342X506
6"	46342X601	46342X602	46342X603	46342X604	46342X605	46342X606
8"	46342X801	46342X802	46342X803	46342X804	46342X805	46342X806

Table 7 – Seal kit part numbers

Please note that 4" and 5" B valves as of 2010 and 6" and 8" B Valves as of 2011 now use 'O' rings to seal the upper and lower housing. The seal kits for these valves contain the original type gasket and the 'O' rings to suit both types of sealing configuration.

Section 8 Trouble shooting

In the event that the cooling system does not operate close to the desired temperature, the following guide may help to identify or locate the problem.

8.1 System temperature too cold

1. Insufficient heat rejected to coolant to maintain temperature.
2. Wrong nominal element temperature selected.
3. Thermostatic valve greatly oversized or cooling capacity of system much greater than required.
4. Thermostatic valve installed backwards, thus sending water to cooler at low temperatures.
5. Worn or leaking O-rings allowing leakage to cooler.
6. Excessive pressure drops across valve.
7. Foreign matter preventing closure of elements.
8. Bimetallic type thermometers will indicate low if calibrated in oil.

8.2 System temperature too hot

1. Cooling capacity of system inadequate.
2. Thermostatic valve too small for flow rate causing high pressure drops and possible cavitation problems.
3. Valve installed backwards, reducing flow to cooler as temperature increases.
4. Bypass will not close due to worn or pitted seats, sliding valve, seals etc.
5. Elements may have seen sufficient over-temperature to prevent full movement, thus preventing full cooling.
6. Solids building up on element sliding valve preventing correct operation.
7. Foreign matter stuck between sliding valve and seat.

Section 9 Technical Specification

9.1 General valve specification

9.1.1 Materials

Body materials.....Aluminium, Bronze, Cast Iron, Ductile Iron,
Steel, Stainless steel
Internal materials (elements).....Stainless Steel and Bronze
Option: Nickel plating
Seal material..... Buna Nitrile, Viton, Neoprene or Ethylene propylene rubber

9.1.2 Maximum working pressure (bar)

Type	Bronze	Cast Iron	Ductile Iron	Steel	Stainless Steel	Aluminium
1½"	10	10	N/A	N/A	N/A	N/A
2"BC/BR	10	10	16	45	45	10
2"BH	N/A	22	N/A	N/A	N/A	N/A
2½"	10	10	16	45	45	10
3"	10	10	16	45	45	10
33	N/A	6	N/A	N/A	N/A	6
4"	10	10	16	20	20	10
5"	10	10	10	N/A	N/A	10
6"	10	10	10	N/A	N/A	10
8"	10	10	10	N/A	N/A	N/A

Table 8 – Maximum working pressure

9.1.3 Valve handling

Suitable care must be taken to avoid injury when handling valves. The mass of the units varies between 11 kg (25 lb) and 315kg (695 lb), depending on size and material. See table below for details of all variations (all weights in Kg).

Type	Bronze	Cast or Ductile Iron	Steel(inc.SS)	Aluminium
1½"	13	11	N/A	N/A
2" BO/BH/BG	13	11	N/A	N/A
2" BF	22	18	N/A	7
2" BC/BR	26	18	20	N/A
2½"	29	24	34	10
3"	36	27	36	11
33	42	35	N/A	14
4"	68	61	N/A	24
5"	109	91	N/A	35
6"	136	123	N/A	48
8"	315	285	N/A	N/A

Table 9 – Model B Valve weights

9.1.4 Storage

Protect stored valves against ingress of dirt and airborne contaminants, and avoid frost or direct sunlight. Do not raise the temperature above the sensing element rating. Storage is permitted down to -40°C (-40°F) for valves containing Nitrile, EPDM, Neoprene 'O' rings and down to -26°C (-14.8°F) for Viton 'O' rings but this must be followed by a slow increase.

Valves should be kept dry and not subjected to any shock loads or abrasion. Valves may be stored in any position and will not deteriorate with time, apart from the 'O' rings, which should be replaced after 7 years.

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